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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,424	02/23/2004	Subbareddy Kanagasabapathy	51123	8584

21874 7590 04/01/2005

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BOSTON, MA 02205

EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/785,424	Applicant(s) KANAGASABAPATHY ET AL.	
	Examiner Sin J. Lee	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicants canceled claims 1-10.
2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

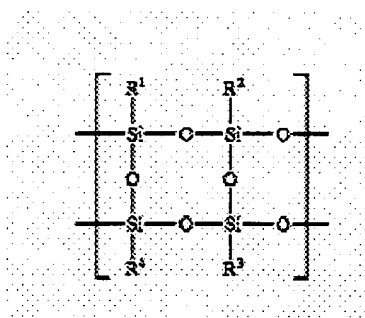
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 102

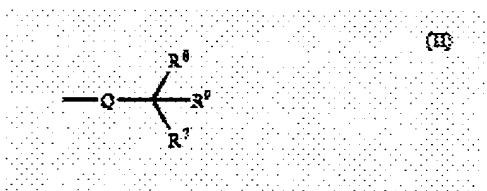
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 11-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Sooriyakumaran et al (US 2002/0081520 A1).

Sooriyakumaran teaches ([0024]) a positive lithographic photoresist composition comprising a fluorocarbinol and/or fluoroacid functionalized *silsesquioxane* polymer or *copolymer* and a photoacid generator. Sooriyakumaran's fluorocarbinol and/or

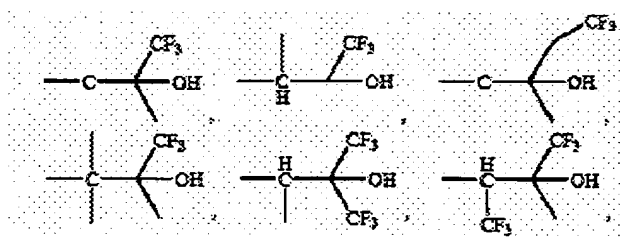
fluoroacid functionalized silsesquioxane polymer comprise a monomer unit of the following structure (I) (see [0044]-[0045])

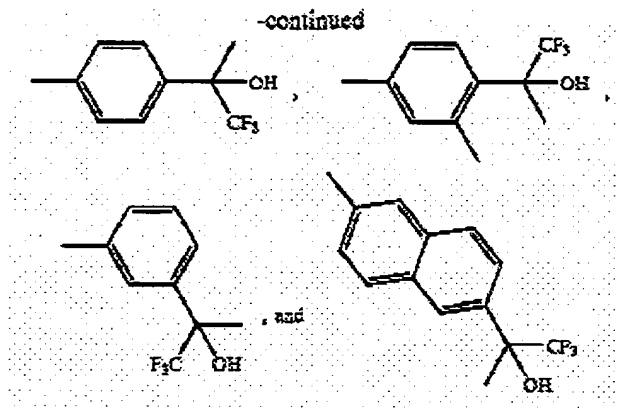


in which R^1 - R^4 are independently selected from the group consisting of substituents having the following structure (II)

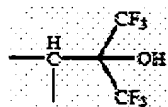


Sooriyakumaran furthermore teaches (see [0047]) following compounds as examples for the substituents having the structure (II) shown above



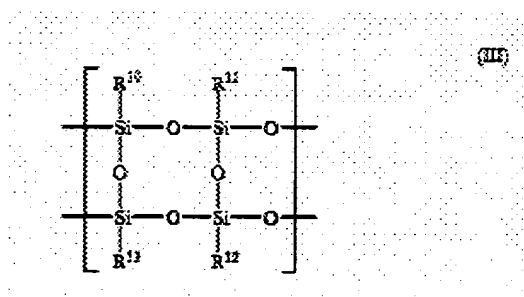


Since there are only ten compounds shown above, one of ordinary skill in the art would immediately envisage



(which includes a 1,1,1,3,3,3-hexafluoro-2-propanol moiety) as Sooriyakumaran's substituent having the structure (II). Therefore, Sooriyakumaran teaches present silsesquioxane resin that comprises hexafluoropropylalcohol group.

Sooriyakumaran furthermore teaches ([0048] and [0049]) that the structure (I) monomer units (as shown above) may be used to form a fluorocarbonol functionalized copolymer comprising the structure (I) monomer units shown above and monomer units having the following structure (III)



in which R^{10} - R^{13} are independently H, linear or branched alkyl, or an acid-cleavable moiety, with the proviso that at least one of R^{10} - R^{13} is an *acid-cleavable moiety*.

Therefore, Sooriyakumaran teaches present silsesquioxane resin that comprises hexafluoropropylalcohol groups and photoacid-labile groups.

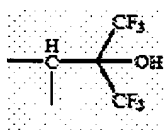
In [0075], Sooriyakumaran teaches a process for generating a resist image on a substrate comprising the steps of: (a) coating a substrate with a film comprising his resist composition; (b) imagewise exposing the film to radiation; and (c) developing the image. Sooriyakumaran furthermore teaches ([0077]) that most preferably, UV radiation having a wavelength of 157 nm or 193 nm is used for the imagewise exposure step. Therefore, one of ordinary skill in the art would immediately envisage using 193 nm radiation for the imagewise exposure step in Sooriyakumaran.

With respect to present limitation “ . . . wherein the exposing of the photoresist does not result in a detectable output of Si species at a concentration of 1×10^{13} molecules/cm² or greater”, present specification states on pg.3 “[w]e have now discovered silsesquioxane polymers, including *fluorinated silsesquioxane polymers* can exhibit reduced or no detectable (e.g., no detection at levels of 10^{13} or 10^{12} molecules/cm²) outgassing of Si species upon exposure to laser radiation (laser radiation being argon-fluoride (ArF, 193 nm) laser at a dose of 50 mJ/cm²). . . . We also have surprising found that such outgassing of Si species does occur with siloxane (i.e., linear *rather than a ladder silsesquioxane polymer*) and other non-silsesquioxane polymers.” Therefore, it is the Examiner’s position that exposing Sooriyakumaran’s photoresist (to 193 nm radiation) would *inherently* not result in a detectable output of Si

species at a concentration of 1×10^{13} molecules/cm² or greater as presently recited in claim 11 because Sooriyakumaran's polymer is a ladder silsesquioxane polymer which contains pendant hexafluoropropylalcohol groups (i.e., Sooriyakumaran's polymer is a fluorinated silsesquioxane polymer). Thus, the prior art teaches present invention of claim 11.

With respect to present claim 12, Sooriyakumaran teaches ([0075]) that the substrate may or may not be coated with an organic anti-reflective layer prior to deposition of the resist composition. Based on this teaching, one of ordinary skill in the art would immediately envisage coating the substrate with an organic anti-reflective layer before depositing Sooriyakumaran's photoresist composition. Therefore, the prior art teaches present invention of claim 12.

With respect to present claims 13 and 14, as discussed above, Sooriyakumaran teaches a copolymer comprising the structure (I) monomer units shown above, in which R¹-R⁴ are represented by the



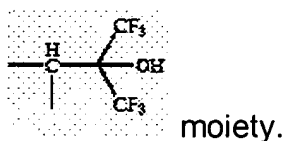
moiety, and the structure monomer units (III) shown above, in which at least one of R¹⁰-R¹³ is an *acid-cleavable moiety* (the rest of the non-acid cleavable moiety of R¹⁰-R¹³ being H, linear or branched alkyl). As suitable acid-cleavable functionalities, Sooriyakumaran teaches (see [0050]) esters of the formula $-(L^1)_n-(CO)-OR^{14}$, carbonates of the formula $-(L^1)_n-O-(CO)-O-R^{15}$, and ethers of the formula $-OR^6$, wherein R¹⁴-R¹⁶ are selected so as to render the functionality acid-cleavable (for

example, those groups listed in the last eight lines of [0050]), n is zero or 1, and L^1 is a linking group such as *an alkylene chain* or a phenylene ring. Based on this teaching, one of ordinary skill in the art would immediately envisage L^1 to be a linking group of an alkylene chain. Therefore, Sooriyakumaran teaches present resin of claims 13 and 14, which is at least substantially or completely free of aromatic groups, and thus teaches present inventions of claims 13 and 14 (besides, none of the silsesquioxane polymers made in Sooriyakumaran's working examples contains aromatic groups).

With respect to present claims 15 and 16, Sooriyakumaran teaches ([0076]) that after the resist composition is coated onto the substrate, the resist film is heated to an elevated temperature of 90-160°C for about 1 minute before the imagewise exposure step. Also, in [0078], Sooriyakumaran teaches that after the photoresist composition is exposed to radiation, the photoresist is again heated to an elevated temperature for a short period of time before the development step. Therefore, the prior art teaches present inventions of claims 15 and 16.

Response to Arguments

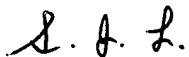
5. Applicants argue that Sooriyakumaran does not suggest a polymer that comprises a hexafluoroisopropylalcohol group. However, this argument is not persuasive, because as discussed above in Paragraph 4, Sooriyakumaran does teach a silsesquioxane polymer that contains



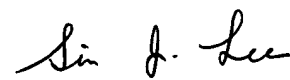
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
March 30, 2005



Sin J. Lee
Patent Examiner
Technology Center 1700